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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,222	01/20/2006	Koji Naniwada	09792909-6522	2255

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EXAMINER

HAMILL, ERIC R

ART UNIT	PAPER NUMBER
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4177

MAIL DATE	DELIVERY MODE
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11/15/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/565,222

Applicant(s)

NANIWADA, KOJI

Examiner

Eric R. Hamill

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 December 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-8508)
Paper No(s)/Mail Date 7/26/07 & 1/20/06
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

2. Figure 9-12 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States

only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 3, 5, 9, 11, and 13 are being rejected under 35 U.S.C. 102(b) as being anticipated by Nguyen (U.S. Patent No. 6,566,786 B2).

For claim 1, Nguyen '786 teaches a MEMS resonator (Abstract) comprising a substrate (Column 9, Line 12) in which a lower electrode (Fig. 5A, element 20; Column 9, Line 14-15) is formed and a beam (Fig. 5A, element 19; Column 9, Line 11) formed on the substrate, wherein at least one support column is provided between said substrate and said beam (Fig. 5A, anchors **18** are support columns; Column 9, Line 9).

For claim 3, Nguyen '786 further teaches a MEMS resonator wherein both upper and lower ends of said support column (Fig. 5a, anchor 18) are integrated with said substrate and said beam (Fig. 5a shows anchors that are integrated with the substrate and the beam).

For claim 5, Nguyen '786 further teaches a MEMS resonator wherein an input electrode for a high frequency signal (Fig. 5a, element 20; Column 9, Lines 14-15) and an output electrode (Fig. 5a, element 24; Column 9, Line 16) for a high frequency signal constitute the lower electrode of said substrate (Column 9, Line 5 discloses that these electrodes work in the high frequency range).

For claim 9, Nguyen '786 further teaches a communication apparatus including a filter to limit a band of a transmission signal and/or reception signal (Abstract), comprising as said filter: a filter that includes a MEMS resonator (Abstract) having a substrate (Column 9, Line 12) where a lower electrode (Fig. 5A, element 20; Column 9, Line 14-15) is formed and a beam (Fig. 5A, element 19; Column 9, Line 11) formed on the substrate, in which at least one support column is provided between said substrate and said beam (Fig. 5A, anchors 18 are support columns; Column 9, Line 9).

For claim 11, Nguyen '786 further teaches a communication apparatus wherein both upper and lower ends of said support column (Fig. 5a, anchor 18) are integrated with said substrate and said beam (Fig. 5a shows anchors that are integrated with the substrate and the beam).

For claim 13, Nguyen '786 further teaches a communication apparatus wherein an input electrode for a required frequency signal (Fig. 5a, element 20; Column 9, Lines 14-15) and an output electrode (Fig. 5a, element 24; Column 9, Line 16) for a required frequency signal constitute the lower electrode of said substrate in said filter (See Column 9, Line 5 disclosing that these electrodes work in a high frequency range).

5. Claims 6-8 are being rejected under 35 U.S.C. 102(e) as being anticipated by Ma (U.S. Patent No. 6,808,954 B2).

For claim 6, Ma teaches a method of manufacturing a MEMS resonator (Abstract), comprising the steps of:

forming a lower electrode (Fig. 4B, element 126; Column 3, Line 12) on a substrate (Column 3, Line 1);

forming a sacrifice layer (Fig. 4C, layer 150; Column 3, Line 27) on said substrate including said lower electrode (Fig. 4C);

selectively forming an opening that reaches said substrate at a portion of said sacrifice layer where a support column should be formed (Fig. 4D, opening 160; Column 3, Line 39);

forming a beam on said sacrifice layer (Fig. 4F, beam 174; Column 3, Lines 51-52) and forming inside said opening the support column (Fig. 4E, column 172; Column 3, Line 47) integrated with said beam and said substrate (Fig. 4F);

and removing said sacrifice layer (Fig. 4J, layer 150; Column 4, Lines 16-17).

For claim 7, Ma further teaches a method of manufacturing a MEMS resonator (Abstract), comprising the steps of:

forming a lower electrode (Fig. 4B, element 126; Column 3, Line 12) and a support column (Fig. 4B, column 130; Column 3, Line 12) on a substrate (Column 3, Line 1);

forming a sacrifice layer (Fig. 4C, layer 150; Column 3, Line 27) on said substrate including said lower electrode and said support column (Fig. 4C);

forming a beam (Fig. 4F, beam 174; Column 3, Lines 51-52) on said sacrifice layer (Fig. 4F);

and removing said sacrifice layer (Fig. 4J, layer 150; Column 4, Lines 16-17).

For claim 8, Ma further teaches a method of manufacturing a MEMS resonator, comprising the steps of:

forming a lower electrode (Fig. 4B, element 126; Column 3, Line 12) on a substrate (Column 3, Line 1);

forming a sacrifice layer (Fig. 4C, layer 150; Column 3, Line 27) on said substrate including said lower electrode (Fig. 4C);

selectively forming an opening having a depth not to reach said substrate at a portion of said sacrifice layer where a support column should be formed (Fig. 4D, opening 160; Column 3, Line 39);

forming a beam on said sacrifice layer (Fig. 4F, beam 174; Column 3, Lines 51-52) and forming inside said opening the support column (Fig. 4E, column 172; Column 3, Line 47) integrated with said beam and said substrate (Fig. 4F);

and removing said sacrifice layer (Fig. 4J, layer 150; Column 4, Lines 16-17)

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 2, 4, 10, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen (U.S. Patent No. 6,566,786 B2) in view of Nguyen (U.S. Patent No. 6,249,073 B1).

Regarding claim 2, Nguyen '786 teaches all of the limitations of claim 1 for the reasons above.

Nguyen '786 fails to teach a MEMS resonator wherein said support column is formed at a position corresponding to a node of a desired oscillation mode of said beam.

Nguyen '073 teaches a MEMS resonator (Abstract) wherein said support column (Fig. 11, dimple 60; Column 11, Lines 62-65 disclose the dimples as supporting) is formed at a position corresponding to a node of a desired oscillation mode of said beam (Column 11, Lines 46-48).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have made Nguyen '786's MEMS resonator with support column dimples at the nodal points as taught by Nguyen '073, since Nguyen '073 teaches that dimple support columns increase the accuracy of the resonator because they allow for a more uniform capacitor gap. (Column 5, Lines 57-65)

Regarding claim 4, Nguyen '073 further teaches a MEMS resonator wherein said support column is formed such that one end thereof is integrated with said substrate or

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said beam and the other end thereof is formed not to contact with said beam or substrate (In Fig. 11, the dimple 60 is integrated in the beam, but not the substrate).

Regarding claim 10, Nguyen '786 teaches all of the limitations of claim 9 for the reasons above.

Nguyen '786 fails to teach a communication apparatus wherein said support column is formed at a position corresponding to a node of a desired oscillation mode of said beam.

Nguyen '073 teaches a communication apparatus (Abstract) wherein said support column (Fig. 11, dimple 60; Column 11, Lines 62-65 disclose the dimples as supporting) is formed at a position corresponding to a node of a desired oscillation mode of said beam (Column 11, Lines 46-48).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have made Nguyen '786's communication apparatus with support column dimples at the nodal points as taught by Nguyen '073, since Nguyen '073 teaches that dimple support columns increase the accuracy of the resonator because they allow for a more uniform capacitor gap. (Column 5, Lines 57-65)

Regarding claim 12, Nguyen '073 further teaches a communication apparatus wherein said support column is formed such that one end thereof is integrated with said substrate or said beam and the other end thereof is formed not to contact with said

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beam or substrate (In Fig. 11, the dimple **60** is integrated in the beam, but not the substrate).

Conclusion

8. Any response to this Office Action should be **faxed** to (571) 273-8300 or **mailed** to:

Commissioner for Patents,
P.O. Box 1450
Alexandria, VA 22313-1450

Hand-Delivered responses should be brought to

Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric Hamill, whose telephone number is (571) 270-1802. The examiner can normally be reached **Mon-Fri** from 7:30-5:00 p.m. eastern time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benny Q. Tieu, can be reached at (571) 272-7490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

10. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published application may be obtained from either Private PAIR or Public PAIR. Status information for unpublished application is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have question on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Eric Hamill

Patent Examiner Art Unit 4177

/Benny Q Tieu/
Supervisory Patent Examiner, Art Unit 4177